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14. ABSTRACT

Unmanned aerial vehicles (UAVs) of all types saturate the battlefield and are quickly becoming a key persistent intelligence, surveillance, and reconnaissance (ISR) capability for commanders at all levels – strategic, operational, and tactical. Commanders' appetite for more ISR is straining the UAV fleet and causing military officials to seek alternatives. Secretary of Defense Robert M. Gates' recently created task force promotes ISR for the warfighters and seeks "low-cost, low-tech alternatives…to do basic reconnaissance." Modern medium and high altitude airships offer tremendous persistent surveillance capability. They complement, not replace, current air and space ISR capabilities. Given the near-future deployment of airships to Afghanistan, operational commanders should now take appropriate steps to properly incorporate this new capability into their operational scheme. This paper begins with a brief overview of airships and presents historical examples of their performance during previous wars. Then, the paper discusses operational considerations for theater-level commanders to examine when planning for the employment of airships. Next, the paper discusses why critics believe airships are not the right tool for future wars. Finally, this paper highlights potential ways to apply UAV lessons learned to overcome possible challenges to employing airships.

15. SUBJECT TERMS

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Airship Renaissance: Considerations for Operational Warfare

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Contents

Abstract

Unmanned aerial vehicles (UAVs) of all types saturate the battlefield and are quickly becoming a key persistent intelligence, surveillance, and reconnaissance (ISR) capability for commanders at all levels – strategic, operational, and tactical. Commanders' appetite for more ISR is straining the UAV fleet and causing military officials to seek alternatives. Secretary of Defense Robert M. Gates' recently created task force promotes ISR for the warfighters and seeks "low-cost, low-tech alternatives…to do basic reconnaissance." Modern medium and high altitude airships offer tremendous persistent surveillance capability. They complement, not replace, current air and space ISR capabilities. Given the near-future deployment of airships to Afghanistan, operational commanders should now take appropriate steps to properly incorporate this new capability into their operational scheme. This paper begins with a brief overview of airships and presents historical examples of their performance during previous wars. Then, the paper discusses operational considerations for theater-level commanders to examine when planning for the employment of airships. Next, the paper discusses why critics believe airships are not the right tool for future wars. Finally, this paper highlights potential ways to apply UAV lessons learned to overcome possible challenges to employing airships.

INTRODUCTION

Know the enemy, know yourself; in a hundred battles you will never be in peril.

– Sun Tzu

Wars are won or lost for multiple reasons. Some might argue that military size, combat power, or logistics are the deciding factors in war. However, history demonstrates that belligerents who best understand and utilize intelligence are generally the war's victor. As Sun Tzu claims, "If ignorant both of your enemy and of yourself, you are certain in every battle to be in peril."[1]

Current Iraq and Afghanistan conflicts prove yet again the importance of intelligence and its significance to the coalition's success. Battlefield commanders' insatiable appetite for situational awareness places greater emphasis on the need for "persistent" surveillance. U. S. Joint Military Doctrine defines persistent surveillance as:

> A collection strategy that emphasizes the ability of some collection systems to linger on demand in an area to detect, locate, characterize, identify, track, target, and possibly provide battle damage assessment and retargeting in near or real-time. Persistent surveillance facilitates the prediction of an adversary's behavior and the formulation and execution of preemptive activities to deter or forestall anticipated adversary courses of action.[2]

Reflecting on his time as commanding general of Multi-National Corps-Iraq, LTG Thomas Metz notes, "Many factors contributed to the victories, but intelligence proved to be the key to all…intelligence provided the basis for every mission".[3] Operational commanders are

[1] Sun Tzu, The Art of War, trans. by Samuel B. Griffith (New York: Oxford University Press, 1971), 84.
[2] Chairman, U.S. Joint Chiefs of Staff, *Joint Intelligence,* final coordination, Joint Publication (JP) 2-0 (Washington, DC: CJCS, 22 June 2007), GL-15.
[3] Metz, Thomas F., William J. Tait Jr., and J. Michael McNealy, "OIF II: Intelligence Leads Successful Counterinsurgency Operations, " *Military Intelligence Professional Bulletin* 31, no. 3 (July-September 2005): 10. http://www.proquest.com (accessed 6 April 2010).

employing a growing number of unmanned aerial vehicles (UAVs), such as the Predator, Reaper, and Global Hawk, to fulfill the surveillance needs, but the demand still exists.[4]

New persistent surveillance capabilities may cost less and be ready for war much sooner than previous systems. In his speech to Air War College students and faculty in 2008, Secretary of Defense Robert M. Gates voiced his concern that the armed services were not moving "aggressively in wartime to provide resources needed now on the battlefield…to get more intelligence, surveillance, and reconnaissance assets into the theatre."[5] Recognizing budget constraints, he pressed the audience to seek "low-cost, low-tech alternatives…to do basic reconnaissance" in an area of operations where the coalition has air supremacy.[6] To pursue these initiatives, Secretary Gates formed a Department of Defense-wide task force to promote intelligence, surveillance, and reconnaissance (ISR) for the warfighters.[7]

While some may view the ISR task force as an avenue to develop exotic and futuristic military systems, others are looking to history for innovative ideas, such as airships. In Iraq and Afghanistan, coalition forces employ a growing number of tethered aerostats for force protection and border monitoring, and are achieving great success.[8] With the success of tethered aerostats, ISR task force members recently met with industry officials about accelerating development of high-flying, long-duration unmanned airships to provide persistent surveillance.[9] Consequently, the Army kicked off a process in January 2010 to

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[4] Frank Oliveri, "When Spying Is a Gas," *CQ Weekly* 68, no. 2 (January 2010): 92, http://www.ebsco.com (accessed 26 March 2010).
[5] Secretary Robert M. Gates (Remarks, Air War College, Maxwell-Gunter Air Force Base, AL, 21 April 2008). http://www.defense.gov/speeches/speech.aspx?speechid=1231 (accessed 22 April 2010).
[6] Ibid.
[7] John T. Bennett, "ISR Task Force puts Airship Program on Fast Track," *Defense News*, 24 August 2009. http://www.defensenews.com/story.php?i=4245093 (accessed 29 March 2010).
[8] Graham Warwick, "Higher Ground," *Flight International*, 15 August 2006. http://www.proquest.com (accessed 29 March 2010).
[9] Bennett, "ISR Task Force".

acquire a medium-altitude long-endurance hybrid airship and expect to deploy it to Afghanistan within 18 months for surveillance missions.[10]

The United States has not flown airships for decades, but recent developments make them more attractive to fulfill Secretary Gates' ISR initiatives. A Congressional Research Service reports summarizes the reasons for the new attention:

> First, U.S. domination of airpower in military conflicts has been overwhelming since 1991. Threats to lighter-than-air platforms appear to be very low by historical standards. Second, the military's demand for "persistent surveillance"…is growing. Third, growing airlift demands have spawned studies on using airships as heavy lift vehicles. Fourth, growing budget pressures have encouraged the study of potential solutions to military problems that may reduce both procurement and operations and maintenance spending. Finally, recent advances in unmanned aerial vehicles suggests that future airships may also be remotely piloted, or fly autonomously.[11]

With greater emphasis on new solutions, operational commanders can expect new capabilities to enter the battlefield very soon.

THESIS/GAMEPLAN

> *We need to be thinking about how we accomplish the missions of the future – from strike to surveillance – in the most affordable and sensible way.*
>
> – Defense Secretary Robert M. Gates

As previously mentioned, UAVs of all types saturate the battlefield and are quickly becoming a key persistent ISR capability for commanders at all levels – strategic, operational, and tactical. Commanders' appetite for more intelligence is straining the UAV fleet and causing military officials to seek alternatives, such as airships. However, are operational commanders adequately prepared to employ these new and unique persistent surveillance capabilities?

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[10] Stephen Trimble, "US Army revives hybrid airship interest with LEMV," *Flight International*, 30 December 2009. http://www.flightglobal.com/articles/2009/12/30/336682/us-army-revives-hybrid-airship-interest-with-lemv.html (accessed 29 March 2010).

[11] Christopher Bolkcom, *Potential Military Use of Airships and Aerostats* (Washington, DC: Congressional Research Service, 2005), CRS-1 – CRS-2.

Modern airships offer tremendous persistent surveillance capability to support the needs of battlefield commanders. Given the near-future deployment of airships to Afghanistan and potentially other areas of operation, operational commanders should now take appropriate steps to properly incorporate this new capability into their operational scheme. First, this paper provides a brief explanation of airships to improve the reader's understanding. Next, it presents historical examples describing the performance of airships during previous wars. Then, the paper discusses operational considerations for theater-level commanders to examine when planning for airship employment. Next, the paper discusses why some critics believe airships are not the right tool for future wars. Finally, this paper highlights potential ways to apply UAV lessons learned to overcome possible challenges to employing airships.

DEFINTIONS AND ASSUMPTIONS

To help better understand the topic, a brief presentation on aerostats, and specifically airships, is useful. Generally defined, aerostats are any type of lighter-than-air aircraft. They are typically categorized as either balloons or airships.[12]. Balloons are unpowered aerostats that can only lift whereas airships are powered aerostats that can lift and maneuver in any direction against the wind. Airplanes develop their lift aerodynamically while an aerostat derives its lift from the buoyancy of a lifting gas, typically helium.[13]

Generally, there are two types of airships: rigid and nonrigid. Rigid airships contain metal frameworks that determine their shape. Individual gas cells inside the framework

[12] Mary Bellis, "History of Airships and Balloons," New York Times Company, http://inventors.about.com/od/astartinventions/ss/airship_2.htm (accessed 7 April 2010).
[13] Walter O. Gordon and Chuck Holland, "Back to the Future: airships and the revolution in strategic airlift," *Air Force Journal of Logistics* 29, no. 3/4 (Winter 2005): 49, http://www.aflma.hq.af.mil/lgj/Vol29_No_3-4_WWW.pdf (accessed 1 April 2010).

provide the lift.[14] This design allows for very large airships, such as the famous *Hindenburg*, that were common during the 1920s and 1930s. Nonrigid airships, also known as blimps, lack metal frameworks so the envelope shape determines its form. A slight pressurization of the lifting gas provides the rigidity for the blimps. The lack of envelope strength limits the size of nonrigid airships.

Combining characteristics from traditional airships and airplanes, hybrid airships quickly are emerging as a viable solution to commanders' requests for more persistent surveillance. A lifting gas provides approximately 80% of a hybrid airship's lift with the final 20% or so achieved by flying like an airplane.[15] Unlike an airplane, hybrid airships take off and land at slower speeds allowing operations from short unprepared runways.[16] This unique capability allows better ground handling, which plagued past airships.

This paper is not an examination of the programmatic or technical aspects of the various types of airships under development. Although defense officials are studying several different missions for airships, such as intertheater heavy airlift, missile defense, weather monitoring, and communications support, this paper focuses on the persistent surveillance capability of airships operating in medium to high altitudes.

HISTORICAL EXAMPLES OF MILITARY EMPLOYMENT

Prior to examining the potential role of airships to future warfare employment, a review of their past contributions during military conflicts illustrates their unique capability. Prior to the 20th century, militaries primarily used balloons for observation. During the

[14] Gordon and Holland, "Back to the Future," 50.
[15] Michael A. Dornheim, "Skunks Working," *Aviation Week & Space Technology* 164, no. 6 (February 2006): 24, http://www.ebsco.com (accessed 26 March 2010).
[16] Ibid.

Napoleonic wars of the 1700s, soldiers launched balloons to monitor troop movements.[17] The U.S. first employed balloons during the Civil War when Union forces established a balloon corps to conduct troop observation missions.[18]

During World War I, the Allies and the Central Powers utilized balloons and airships for maritime surveillance and strategic bombing. German forces used rigid airships, commonly known as zeppelins, to drop bombs on London and scout the waters ahead of their naval fleets.[19] For the Army Air Service, "sausages" (the term used to describe the early days of ballooning) proved successful for artillery spotting and observation.[20] At the conclusion of World War I, the U.S. obtained a German zeppelin as war compensation, conditional that she was restricted to "civil" purposes.[21] The U.S. would explore airships' unique characteristics, which proved vital on the dawn of the Second World War.

The U.S. military's experience with airships during the Interwar Years highlighted the difficulties of integrating new technologies into the armed forces. From 1923 to 1935, the Navy operated four rigid airships – *Shenandoah, Los Angeles, Akron,* and *Macon.*[22] Three of the four were lost to mishaps, and only the *Los Angeles* retired intact. *Macon,* the final Navy airship lost to a mishap, encountered a violent storm off the coast of California and sank. Although all but two of her crew survived, the *Macon* crash effectively ended the Navy's "controversial, and trouble-plagued, program of rigid airship operations."[23] In

[17] David Ison, "Persistent coverage Airships return for high-altitude ISR," *C4ISR,* October 2006: 28, http://www.proquest.com (accessed 25 March 2010).
[18] Ibid.
[19] Erik Schechter, "Airships on the rise Blimps to challenge UAVs as ISR craft as," *C4ISR*, September 2008: 30, http://www.proquest.com (accessed 29 March 2010).
[20] Grant, "Are Airships for Real?" 67.
[21] Naval Historical Center, "USS Los Angeles (ZR-3), Airship 1924-1939," Department of the Navy, http://www.history.navy.mil/photos/ac-usn22/z-types/zr3.htm (accessed 7 April 2010).
[22] Gordon and Holland, "Back to the Future," 49.
[23] Naval Historical Center, "USS Macon (ZRS-5), Airship 1933-1935," Department of the Navy, http://www.history.navy.mil/photos/ac-usn22/z-types/zrs5.htm (accessed 7 April 2010).

addition, facing tight budget constraints, the Army Air Corps dropped its interest in airships and turned its entire fleet over to the Navy in 1937.[24]

Although the Navy terminated its rigid airship program, it found great success using blimps during World War II. At the start of World War II, the Navy possessed only 10 nonrigid airships.[25] By 1945, the Navy's fleet of blimps totaled 141 and primarily executed coastal defense and open ocean escort missions.[26] Additionally, the Navy utilized blimps for anti-submarine warfare and airborne early warning.[27] During World War II, Navy blimps escorted 89,000 surface ships without the loss of a single vessel to U-boat attacks.[28] Following the war, the Navy kept some semblance of a program but eventually retired the last blimp in 1962.[29]

CURRENT U.S. MILITARY EMPLOYMENT

Although the U.S. discontinued its use of manned airships in 1962, the military has found great success with unmanned tethered aerostats to assist with drug interdiction and force protection. Resembling a cross between a blimp and balloon, unmanned tethered aerostats can reach altitudes of 12,000 feet and are able to stay airborne for months at a time.[30] Several tethered aerostats operate along the southern U.S. border and in the Caribbean monitoring drug smuggling activities. Supporting force protection, the Army operates low-flying tethered aerostats, equipped with day and night sensors, for various monitoring activities in Afghanistan and Iraq.[31]

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[24] Grant, "Are Airships for Real?" 67.
[25] Ibid., 68.
[26] Ibid.
[27] Oliveri, "When Spying Is a Gas," 92.
[28] Grant, "Are Airships for Real?" 68.
[29] Patricia Kime, "Lighter-than-Air ISR." *Sea Power* 51, no. 9 (September 2008): 52. http://www.ebsco.com (accessed 25 March 2010).
[30] Grant, "Are Airships for Real?" 68.
[31] Bolkcom, *Potential Military Use*, CRS-2.

DISCUSSION / ANALYSIS

> Without balance, we risk being dominant but irrelevant that is, superior in nuclear and conventional warfare, but poorly equipped to prevail in irregular contests. USJFCOM will move swiftly to make irregular warfare (IW) a core competency of our military without losing conventional or nuclear superiority.
>
> Gen James M. Mattis[32]

During his testimony to the Senate, Commander of U.S. Joint Forces Command General James M. Mattis presents a compelling argument that the U.S. armed forces need to do a better job at irregular warfare. The military may be superior in nuclear and conventional warfare, but it is "not yet superior in irregular warfare."[33] To help overcome this deficiency, operational commanders require nonstop observation of the battlefield to determine the enemy's movements and intentions. With their ability to stay aloft for more than 24 hours at a time, UAVs added a new dimension to persistent surveillance and changed the way theater commanders plan and fight armed conflicts. Many challenges surfaced due to the increased employment of UAVs in the battlespace. Some of these challenges included airspace deconfliction, interoperability with U.S. and Allied command and control systems, communication bandwidth demand, unique ground control systems, and enormous amounts of information that overloaded intelligence analysts. Soon, airships will enter the battle and could encounter similar challenges. This section of the paper discusses operational considerations for theater-level commanders and their staffs to examine to ensure a smooth transition of airships into the battlespace.

Operational Command and Control

[32] James M. Mattis, "Testimony," Senate, *Status of U.S. Military Commands: Hearing before the Committee on Senate Armed Services,* 111th Cong., 1st sess., 2009, http://www.lexis-nexis.com (accessed 4 April 2010).
[33] Ibid.

Command and control encompasses the exercise of authority and direction by a commander over assigned and attached forces in the accomplishment of the mission.[34] Because medium and high-altitude airships will be part of joint air operations, command and control should reside with the Joint Force Air Component Commander (JFACC). This seems logical since the JFACC's responsibilities normally include "planning, coordinating, and monitoring joint air operations."[35]

Another reason command and control of airships should reside with the JFACC is the issue of airspace deconfliction. Airspace deconfliction is becoming a larger problem with the explosion of UAVs in the area of operations. Adding airships to the already overcrowded airspace places greater challenges on operational staffs, manned aircraft pilots, and UAV operators. Since the JFACC normally assumes airspace control authority (ACA) responsibilities, it seems logical that operational command and control of airships should reside with the JFACC.

Operational Intelligence

The greatest advantage airships provide to commanders is in regards to operational intelligence. Operational intelligence is fundamental to all joint operations. It tells joint force commanders what the enemy is doing, what they are capable of doing, and what they may do in the future.[36] With their extended loiter times, airships augment, not replace, the joint force commander's collection capabilities of manned aircraft, UAVs, and satellites.

Advantages and disadvantages exist for each air and space asset, which is why a proper mix of all assets provides the operational commander the greatest flexibility. For

[34] Chairman, U.S. Joint Chiefs of Staff, *Joint Operations*, final coordination, Joint Publication (JP) 3-0 (Washington, DC: CJCS, 13 February 2008), III-1.
[35] Ibid., III-8.
[36] Ibid., III-16.

example, airships can fly longer sorties than fixed-wing aircraft. Fuel capacity limits the flight time of manned and unmanned fixed-wing aircraft.[37] Supporters expect future airships to remain airborne for several weeks at a time and unmanned versions could theoretically stay aloft indefinitely.[38]

Joint force commanders require fewer airships to provide the same coverage as fixed-wing aircraft. For example, the Air Force is expanding the number of UAVs flying over the skies of Afghanistan and Iraq to keep up with intelligence demands from the battlefield.[39] The Air Force measures coverage by the number of combat air patrols (CAPs) it can provide in the areas of operation. Each CAP requires three aircraft – one on station, one transiting to or from station, and one in maintenance. There are currently 40 CAPs in Iraq and Afghanistan, and that number will jump to 65 (or 195 UAVs) by 2013.[40] As previously mentioned, airships will not replace UAVs, but complement them. They can provide constant surveillance and "tip-off" armed UAVs for closer looks or kinetic actions.

Unmanned high altitude airships, operating in "near space", offer greater surveillance coverage area. Generally, "near space" is the air between 65,000 ft and 300,000 ft where the air is too thin for traditional aircraft to operate and there is too much gravity for satellites to orbit.[41] According to Ron Browning, business development director for Lockheed Martin's high altitude airship program, looking down from an altitude of 65,000 ft, an airship can view an area exceeding 800,000 km^2, which is larger than Iraq or Afghanistan.[42] Satellites provide

[37] Caitlin Harrington, "Plugging the Gap," *Jane's Defence Weekly* 43, no. 44 (November 2006): 28, http://www.ebsco.com (accessed 29 March 2010).
[38] Ibid., 27.
[39] Gordon Lubold, "As drones multiply in Iraq and Afghanistan, so do their uses," *The Christian Science Monitor* (2 March 2010), http://www.csmonitor.com/USA/Military/2010/0302/As-drones-multiply-in-Iraq-and-Afghanistan-so-do-their-uses (accessed 6 April 2010).
[40] Ibid.
[41] Harrington, "Plugging the Gap," 27.
[42] Warwick, "Higher Ground."

coverage of large and denied access areas, but are restricted by their orbit times and therefore can only survey an area for limited and predictable fixed amounts of time.[43] Because satellite command and control remains with national authorities, theater commanders do not exercise operational control over these national assets. In contrast, airships would be a theater surveillance asset under the operational control of the joint force commander.

Additionally, airships provide greater flexibility for operational employment than current space and air ISR assets. Satellites provide area of operation surveillance during the beginning of an armed conflict, but cannot provide continuous coverage. To provide continuous coverage, manned aircraft and UAVs must be stationed near the area of operation and require forward basing options. By contrast, U.S.-based airships could provide continuous coverage and require minimal forward basing options. However, airships require more time to move to the area of operations. Operational commanders could employ a layered approach where satellites provide initial coverage while airships are transiting to the area of operations. Once in place, airships would assume continuous coverage while other forces move forward.

Because airships can return to base for maintenance and payload swapping, operational commanders possess additional employment options and flexibility. Satellite payloads require engineering to withstand high G-forces, shock, and vibration during rocket launch.[44] Generally, launch schedules are determined months or years in advance. This limitation does not allow satellite launches to be reactive to current operations. Conversely, airships provide a vibration-free environment that is more suitable to extremely delicate

[43] Harrington, "Plugging the Gap," 28.
[44] George Marsh, "Airships: Making a Comeback." *Avionics Magazine* (1 April 2004), http://www.aviationtoday.com/av/categories/bga/816.html (accessed 26 March 2010).

electronic payloads.[45] Because airships can land, operational commanders maintain the flexibility to change payloads based on the needs of the operation. It is like having a personal fleet of payload-swapping satellites.

Operational Sustainment

Operational sustainment is another area for operational staffs to consider when employing airships in a major operation. Since medium and high altitude airships will have long dwell times measured in weeks or possibly months, operational commanders maintain the flexibility to operate them from rear continental U.S. bases, intermediate bases located outside of the combatant commander's theater of operations, or forward operating bases located in the area of operations. Employing airships from bases located outside the combatant commander's theater of operations reduces sustainment requirements for forward operating bases. During the recent European Command and African Command Science and Technology Conference, an ISR Task Force presentation compared the personnel per orbit required for the following airborne ISR platforms: E-8 JSTARS, MQ-1 Predator, MQ-9 Reaper, and the Army's new medium altitude hybrid airship, the Long Endurance Multi-int Vehicle (LEMV).[46] To operate 12 orbits, the report concludes that the Army's hybrid airships require only 230 personnel to operate compared to over 3,000 personnel needed for the E-8 JSTARS and 1,400 people for the MQ-1 Predator or MQ-9 Reaper.[47]

Basing airships at airfields located in the area of operations carries different challenges that logisticians must consider. On the positive side, since airships do not require the aerodynamic lift that airplanes require, they can operate from shorter airfields. However,

[45] Harrington, "Plugging the Gap," 27.
[46] Ed Loxterkamp, "ISR Task Force II," Powerpoint, 9 June 2009, Washington, DC: Department of Defense, slide 9, http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA511680&Location=U2&doc=GetTRDoc.pdf (accessed 17 April 2010).
[47] Ibid.

modern airships could face the same environmental and weather related problems that plagued earlier airships requiring larger hangers to protect them from the elements.[48] Handling large airships during ground operations is another area of concern – one that proved very difficult during the early stages of the U.S. military airship program. Newer airships incorporate engine-driven propellers, vectored thrust, and air cushion landing system's that should improve their ground handling capabilities.

Forward-deployed airships require less fuel support than conventional fixed-wing aircraft. Fuel transportation and storage are key considerations for logisticians. Recently, U.S. Naval Sea Systems Command (NAVSEA) illustrated the significant difference in surveillance cost per hour between airships, manned aircraft, and UAVs. An airship costs about $610 per hour; an MQ-1 Predator UAV about $5,000 per hour; an E-2C Hawkeye Airborne Warning and Control System aircraft about $18,000 per hour; and an RQ-4 Global Hawk UAV about $26,500 per hour.[49] Higher costs per hour mean more fuel that an operational planner must transport and provide storage.

Operational Protection

In the words of Dr. Milan Vego, "protection of one's combat forces and infrastructure…is one of the most important responsibilities of any commander."[50] Joint doctrine defines protection as the "preservation of the effectiveness and survivability of mission-related military and nonmilitary personnel, equipment, facilities, information, and

[48] Grant, "Are Airships for Real?" 70.
[49] Defense Industry Daily, "Return of the Navy Blimps?" http://www.defenseindustrydaily.com/return-of-the-navy-blimps-03093 (accessed 9 April 2010).
[50] Milan Vego, *Joint Operational Warfare Theory and Practice* (Newport, RI: Naval War College Press, 2009), VIII-95.

infrastructure deployed or located within or outside the boundaries of a given operational area."[51] Protection focuses on conserving the joint forces in four primary ways:

> 1. **Active defensive measures** that protect the joint force, its information, its bases, necessary infrastructure, and lines of communications from an adversary's attack
> 2. **Passive defensive measures** that make friendly forces, systems, and facilities difficult to locate, strike, and destroy
> 3. **Applying technology and procedures** to reduce the risk of fratricide
> 4. **Emergency management and response** to reduce the loss of personnel and capabilities due to accidents, health threats, and natural disasters[52]

Operational protection encompasses several tasks and key considerations, but this section of the paper discusses only those relevant to airships.

Airships offer additional measures that operational commanders can incorporate into their force protection plan. In the current wars in Afghanistan and Iraq, insurgents regularly cross the borders and disrupt the coalition's lines of communication. Rep. Duncan Hunter (R-CA]), member of the Armed Services Committee, writes that the greatest threat in Afghanistan is the "regular inflow of terrorist elements across the 1,500 mile border between Pakistan and Afghanistan."[53] The congressman believes Afghanistan's rugged terrain "does not lend itself easily to infantry patrols," but is more suitable for a "curtain" of ISR coverage.[54]

A small number of medium or high altitude airships could provide Representative Hunter's "curtain." A single airship could simultaneously watch over multiple border crossings or lines of communication based on the proximity of the interest areas. As discussed previously, low-flying tethered aerostats currently provide force protection and

[51] JP 3-0, *Joint Operations*, GL-23.
[52] Ibid., III-24.
[53] Duncan Hunter, "Surveillance now a necessity," *Washington Times*, 19 August 2008, http://www.lexisnexis.com (accessed 6 April 2010).
[54] Ibid.

border monitoring to forces in Iraq and Afghanistan. However, anchored location and operating altitude limit tethered aerostats' surveillance coverage. In contrast, medium and high altitude airships provide greater surveillance coverage and the flexibility to relocate as required. Employing several airships along a border could reduce the number of insurgents entering the battlefield. As an example, the North American Aerospace Defense Command (NORAD) claims that eleven high altitude airships, stationed around the U.S. coastline, could provide overlapping radar coverage for all maritime and border approaches.[55]

COUNTERARGUMENT

Airships offer several advantages to operational commanders, but some critics believe it is not the right capability in today's wars. A report from the Congressional Research Service challenges if "the operational need for airships and aerostats, and their ability to satisfy this need, outweigh the costs of developing and fielding them."[56] With growing economic concerns and the likelihood of shrinking defense budgets, can the Department of Defense "find room in its budget for another procurement program?"[57] Furthermore, Congress is worried that technological concerns pose too much of a technical challenge.[58]

Weather effects present another challenge to employing airships in operations. Weather and environmental challenges affect any type of aircraft, but some believe airships are more vulnerable to weather than are conventional aircraft.[59] Modern airships face and must overcome the same weather and environmental problems that plagued the Navy's airship program in the early 1900s.[60]

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[55] Marsh, "Airships."
[56] Bolkcom, *Potential Military Use*, CRS-4.
[57] Ibid.
[58] Harrington, "Plugging the Gap," 28.
[59] Bolkcom, *Potential Military Use*, CRS-6.
[60] Grant, "Are Airships for Real?" 70.

As previously mentioned, airspace congestion is a growing problem for operational commanders. The proliferation of remotely piloted UAVs concerns operational commanders. Lt Gen Walter Buchanan, former commander of U.S. Central Command Air Forces during Operation IRAQI FREDOM, expressed his concerns about airspace:

> So far, we have been fortunate. We've hit some helicopters, but we haven't hurt anybody yet. I fear the day when it's going to happen. What I worry about is the day when I have a C-130 down low with a cargo load full of soldiers, and a UAV -- it won't have to be a big one -- comes right through the cockpit windshield.[61]

Introducing airships to the battlefield, coupled with more UAVs, escalates the uneasiness felt by operational commanders.

Perhaps the greatest concern with airships is their vulnerability to attacks from surface or air threats. Flying at low speeds or hovering over one area, airships provide the enemies a large target. Even at high altitudes, airships would fly within reach of many surface-to-air weapons.[62] Would the operational commander employ a potentially low density, high demand asset in an area prior to gaining air superiority? Even with air superiority, would operational commanders have to protect these airships with fighters and if so, how many?[63]

CONCLUSIONS

Medium and high altitude airships complement, not replace, current air and space surveillance capabilities. Each capability provides unique characteristics that are not all found in just a single system. The demand for persistent surveillance continues to grow and mounting defense budget pressures force Department of Defense officials to seek low cost

[61] Glenn W. Goodman Jr., "Congested Airspace Low-Flying UAVs Create Hazards for Manned Aircraft," *Defense News* (30 January 2006): 30, http://www.proquest.com (accessed 16 April 2010).
[62] Bolkcom, *Potential Military Use*, CRS-6.
[63] Ibid.

solutions, such as airships. As more airships enter the battlefield, operational commanders face challenges similar to those experienced with the proliferation of UAVs. Lessons learned from UAVs provide several considerations operational commanders and their staff must examine when employing airships.

First, operational staffs must consider where to base long-duration airships. In his testimony to Congress, General Mattis discussed future difficulties of "projecting power globally in an environment where access to forward operating bases will become increasingly limited."[64] Airships offer operational staffs the flexibility of deploying airships from the continental U.S minimizing the theater logistics footprint.

Second, airships can host multiple sensor payloads to support multiple missions and users. Operational commanders may want the flexibility of landing airships to swap out payloads for new missions. Consequently, multiple payloads supporting multiple users present operational staffs with another challenge. Repositioning airships will most likely affect some users relying on specific sensor feeds. Operational staffs should develop clear processes, procedures, and designate the appropriate decision authority to coordinate airship "retaskings" and minimize service disruption.

Finally, operational commanders must resist overreliance on specific assets. With the "explosive growth" of UAVs, they have proven to be an invaluable force multiplier for the joint force commander.[65] Staffs must become familiar with all persistent surveillance capabilities and withstand the desire to rely on just one type of asset. Each space and ISR asset provides unique advantages and disadvantages. Properly integrating all assets ensures

[64] Mattis, "Testimony."
[65] U.S. Department of Defense, *Office of the Secretary of Defense Unmanned Systems Roadmap (2009-2034)* (Washington, DC: Department of Defense, April 2009): 2.

the operational commander has the right balance to provide persistent surveillance to all battlefield commanders.

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